PB-215 658

BULLETIN OF COURSES: WATER POLLUTION CONTROL TRAINING PROGRAM; JULY 1969 TO DECEMBER 1970

Federal Water Pollution Control Administration
Washington, D. C.

28 February 1969

DISTRIBUTED BY:

NTIS

National Technical Information Service
U. S. DEPARTMENT OF COMMERCE
5285 Port Royal Road, Springfield Va. 22151

PB 215 658

BULLETIN OF COURSES

JULY 1969 TO DECEMBER 1970

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
U S Department of Commerce
Springfield VA 22151

WATER POLLUTION CONTROL TRAINING PROGRAM

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

Training for CLEAN WATER

"——— I support the basic concepts as outlined in the Water Quality Act of 1965, as amended. I am convinced that with proper administration, adequate financing, and good tough enforcement the objectives as outlined by Congress can be attained. Our Federal program requires a cooperative effort by local, state and National governments, coupled with the support of private industry and the general public. It is only when all these elements of society work together that we can realize progress in cleaning up the polluted waters and prevent further pollution.

The Department of the Interior must utilize to the utmost the present laws. We must seek new authority where new authority is needed. We must be willing to move in new directions and assist the States in developing programs which will prevent as well as control water pollution. We must establish the proper guidelines so that each entity will know its responsibilities. Industry must know what is expected of it, as must the municipalities, the States, and the regional and interstate groups. We must develop the technical capability that is needed. We must have training programs. There is much that needs to be done. ———"

Statement by Secretary Walter J. Hickel
Before the Senate Public Works Committee
Subcommittee on Air and Water Pollution
February 28, 1969.

JULY 1969 TO DECEMBER 1970

BULLETIN OF COURSES

WATER POLLUTION CONTROL TRAINING PROGRAM

Details of illustrations in this document may be better studied on microfiche.

U.S. DEPARTMENT OF THE INTERIOR

Federal Water Pollution Control Administration

FWPCA TRAINING LOCATIONS

Information for Applicants

The Federal Water Pollution Control Administration of the U.S. Department of the Interior conducts programs of research, technical assistance, enforcement, and training for water pollution control.

Training is offered by the Federal Water Pollution Control Administration at five locations in the United States. These locations are the Robert A. Taft Sanitary Engineering Center in Cincinnati, Ohio; the Robert S. Kerr Water Research Center in Ada, Oklahoma; the Southeast Water Laboratory in Athens, Georgia; the Pacific Northwest Water Laboratory in Corvallis, Oregon; and the Hudson-Delaware Basins Office in Edison, New Jersey.

The objective of the Training Program is to provide specialized training in the causes, prevention, and control of water pollution. Training not generally available elsewhere is featured in specialized subjects, including recent developments in sanitary engineering, chemistry, aquatic biology, and microbiology in the field and in the laboratory. It is expected that this training will lead to rapid application of new research findings, increase skills of technical and professional personnel, and train new employees recruited from other professional or technical areas in the special skills required in water pollution control. Scientists, engineers, and recognized authorities from other FWPCA programs other government agencies, universities, and industry, supplement the training staff by serving as guest lecturers and special consultants.

Most training is conducted in the form of highly technical, short-term, courses of one or two week's duration. The scope and level of these courses is designed to meet specific practical features of wastewater treatment plant design and operation, water quality evaluation in field and laboratory, and technical and administrative aspects of water quality management and water pollution control.

The primary responsibility of the States in the training of wastewater treatment plant operators is recognized. Accordingly, in training those directly responsible for operations of wastewater treatment plants, the FWPCA direct training role is to supplement and support, and not to supplant, State programs of operator training. In fulfilling this responsibility, the FWPCA training units do admit selected key personnel from wastewater treatment plants for training in subjects not generally included in the State programs of operator training. It is expected that these students will be able to transmit the benefits of their training to other operational personnel, either through formal training programs or through the informal type of training associated with on-the-job relationships.

Support of operator-training programs of the States is available through technical consultations in the planning and development of operator-training courses. Guest appearances of instructors from the Training Programs of the Federal Water Pollution Control Administration can be arranged; instructional materials such as training manuals, course plans, and training aids can be made available, subject to priorities of existing training schedules, or may be reproduced freely.

ADMISSION TO COURSES

Admission to courses is by application forms provided at the back of this Bulletin. Additional forms may be obtained from any training unit of the FWPCA shown on the page opposite.

NO TUITION OR REGISTRATION FEE IS CHARGED. Early application is advised, since course enrollments are limited. Students arrange for their own housing and transportation while attending courses. To apply for admission to a course, fill out an application from the back of this Bulletin, using a separate form for each course. (Where appropriate, please be sure to secure the signature of approval from the appropriate supervisor in your administrative chain of command.) Mail the application to the FWPCA training facility offering the course you wish to attend.

Information on local transportation and housing will be mailed to accepted applicants four to six weeks *prior to course date. At this time, information will be provided with respect to the day* and hour of course opening and closing. Please arrange travel plans to conform to the announced course schedule.

Related Environmental Training Programs

Listed below are other training programs which may be of interest to the reader of this bulletin. Inquiries about specific courses should be sent directly to the programs involved.

Chief, Training Institute
Environmental Control Administration
P. O. Box 30200
Cincinnati, OH 45230

Director, Office of Manpower Development
National Air Pollution Control Administration
P. O. Box 12055
Research Triangle Park, NC 27709

Chief, Training Branch
National Communicable Disease Center
Atlanta, GA 30333

Contents

Course Descriptions 8

Federal Water Pollution Control Administration
Facilities Offering Training 29

Ada, Oklahoma 31

Athens, Georgia 33

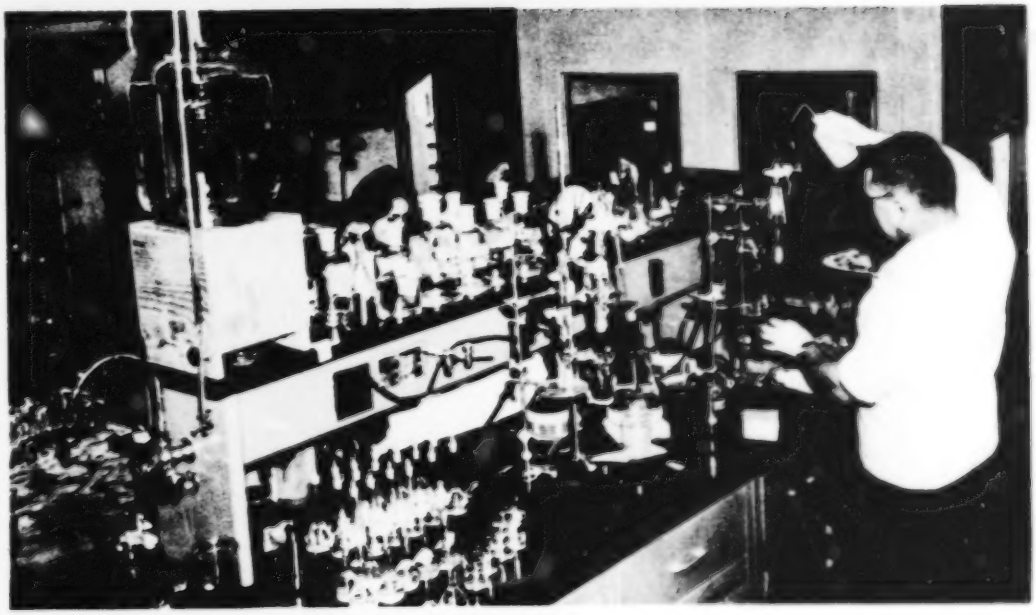
Cincinnati, Ohio 35

Corvallis, Oregon 37

Edison, New Jersey 39

Applications for Training 41

Chronological Schedule of Courses ..... inside back cover



Course Descriptions

CHEMICAL ANALYSES FOR WATER QUALITY (100)

2 weeks

CINCINNATI, OHIO July 28–August 8, 1969
November 3–14, 1969
July 13–24, 1970

CORVALLIS, OREGON March 2–13, 1970

This course is designed for chemists, biologists and engineers having a professional background and responsibility in performing, using, or interpreting chemical analyses for water quality.

Learning objectives for the student are:

To understand selected tests employed in chemical analysis
To know the advantages and limitations of specific test methods or instrumentation
To select the more effective analytical methods
To perform selected wet chemical and instrumental methods, and
To evaluate results in terms of statistical inferences

Selected analytical procedures are presented in lecture-discussion sessions in the classroom outlining essentials of the tests, control techniques and interpretations. Various methods are stressed to increase specificity and validity of chemical criteria related to water pollution control, and compliance with water quality standards. About half of the course time is devoted to practice in laboratory operations. The students utilize wet chemical procedures and instrumentation for visible, infrared, flame and atomic absorption spectroscopy, dissolved oxygen, pH and conductivity meters. Calculations of results are performed in homework or workshop sessions and the results compared statistically in class discussions.

BASIC WATER QUALITY CHEMISTRY (100.1)

1 week

EDISON, NEW JERSEY January 5–9, 1970

This course is designed for chemists or technicians who have completed at least high school chemistry but have little or no experience in environmental water or wastewater analysis.

The major course objective is to enable students to accurately perform selected analytical methods. Secondary objectives include enabling students to implement a quality control program, select methods to overcome interferences or meet special requirements, and evaluate results in terms of statistical inference.

Approximately half of the class time will be spent in laboratory application. Neither water nor wastewater analysis is predominant. Analytical methods covered include dissolved oxygen (Winkler and instrumental), biochemical oxygen demand, chemical oxygen demand, alkalinity, acidity, ammonia and organic nitrogen, nitrate-nitrite, phosphate, suspended solids, pH, and conductivity.

NOTE: This course is designed for persons who will actually perform analyses. Individuals who require "familiarization" or "appreciation" of analyses are referred to courses of the Water Quality Studies series.

SURVEY OF CHEMICAL ANALYSES FOR WATER QUALITY (100.2)

1 week

ANCHORAGE, ALASKA* April 13–17, 1970

This course is designed for chemists, biologists and engineers having a professional background and responsibility in performing, using or interpreting chemical analyses for water quality.

Learning objectives for the student are:

- To understand selected tests employed in chemical analysis
- To know advantages and limitations of specific test methods or instrumentation
- To select the more effective analytical methods
- To evaluate results in terms of statistical inferences

Selected analytical procedures are presented in lecture-discussion sessions in the classroom outlining essentials of the tests, control techniques, and interpretations. Special application is made to the Arctic environment. Various methods are stressed to increase specificity and validity of chemical criteria related to water pollution control, and compliance with water quality standards. Laboratory demonstrations or limited class application will be included, with special reference to the more widely used test procedures.

*Application for the Anchorage, Alaska course should be submitted to:

Manpower and Training Officer
Pacific Northwest Water Laboratory
200 S. 35th Street
Corvallis, Oregon 97330

CHARACTERIZATION AND TREATMENT OF ORGANIC INDUSTRIAL WASTES (101)

2 weeks

ATHENS, GEORGIA Sept. 28–Oct. 9, 1970

This course is offered for engineers, chemists, and other professional personnel concerned with the characterization and treatment of organic industrial wastes. The course is designed for persons who have some degree of specialization in industrial wastes surveys and treatment procedures but whose experience or range of coverage in this field is limited. The interests of both public officials and representatives of industry will receive coverage.

On completion of the course the student should be able to select and perform procedures for collecting, characterizing and measuring quantities of industrial water pollutants. It is also an objective of this course that the student be able to evaluate and select methods of treatment applicable to industrial wastes. This course has the further objective of providing insight to regulatory personnel on waste treatment problems and in bringing to the attention of industry the problems faced by water pollution control agencies in performing their job.

Participants will devote a considerable portion of course time to laboratory studies of organic pollutant detection techniques. Laboratory work will include column and thin-layer and gas chromatography and infrared spectroscopy. Laboratory and problem sessions will also be devoted to selection of adequate treatment methods for several organic industrial wastes. The wastes to be discussed include those from the textile production, pulp and paper, and oil refining industries.

The utilization of advanced waste treatment methods, especially as applied to removal of organic industrial wastes, will be covered. Time will be devoted to selection and use of monitoring equipment.

PESTICIDE RESIDUE ANALYSIS IN WATER (103.1)

(Gas Chromatographic Systems and Techniques)

1 week

ATHENS, GEORGIA **January 19–23, 1970**

This course is primarily designed for professionals and technicians who are involved in the analysis of pesticide residue in water. The course includes an introduction to residue analysis and progresses into advanced use of the gas chromatograph.

After completing the course the student will be able to use extraction and cleanup procedures for the analysis of a water sample for pesticide content. He will be able to use a gas chromatograph for pesticide residue content in a water sample. He will be able to measure the cholinesterase inhibition in fish by applying colorimetric analysis.

The analytical procedures taught in the course will conform to those now being used by the Federal Water Pollution Control Administration in its investigations.

Subject matter to be covered includes:

- Extraction methods
- Sample preparation
- Sample analysis
- Methods for detection of cholinesterase inhibition
- Gas chromatography systems and function
  - Flow system
  - Temperature control
  - Electrometer
  - Detectors
  - Recorders
- Column technology
- Trouble shooting
- Quantitation

Laboratory practice will be emphasized, utilizing gas chromatographic systems.

PESTICIDE RESIDUE ANALYSIS IN WATER (103.2)

(Infrared Spectroscopy and Thin Layer Chromatography)

1 week

ATHENS, GEORGIA **February 9–13, 1970**

This course is designed for analytical chemists or for technicians with suitable training or experience who are involved in the analysis of pesticide residue in water.

Upon completion of the course the participant will understand the basic principles of infrared spectroscopy for the interpretation of major functional groups applicable to pesticide residues. He will be able to apply basic procedures for the preparation of thin layer plates and the use of these as a cleanup procedure for pesticide residues prior to their identification by infrared spectroscopy.

The methods of instruction will include lectures, discussions and laboratory work on the following subjects.

- Principles and theory of infrared spectroscopy
- Basic instrumentation and accessories
- Interpretation of major functional groups
- Practical applications such as sampling techniques used in pesticide residue analysis
- Maintenance and trouble shooting of infrared equipment
- Principles of chromatography
- Preparation of thin-layer plates
- Spotting, developing and evaluating thin-layer chromatograms used for pesticide residue analysis

PESTICIDE ECOLOGY SEMINAR (103.3)

3 days

ATHENS, GEORGIA February 24–26, 1970

This seminar is offered for personnel concerned with the effects of pesticides on the freshwater and estuarine biota.

The participant will recognize some of the major influences of pesticides on ecologic relations in environmental waters.

Particular attention will be centered on the distribution, fate, and effects of pesticides in water. The results of the latest research findings such as the effect of cycling on the pesticide, the role of sediments, and the role that the biota play on the pesticide will be stressed.

Reproduced from best available copy.

ORIENTATION TO AUTOMATED INSTRUMENTATION IN SURVEILLANCE (106)

1 week

CINCINNATI, OHIO April 27–May 1, 1970

This course is offered for management personnel responsible for program development and execution of water pollution surveillance programs.

The course is intended to provide participants with understanding of the capabilities of automated, multiparameter water quality surveillance instrumentation and principles of utilization of such instrumentation in continuous, long-term surveillance programs.

Lectures, panel discussions, and demonstrations are utilized to define environmental situations which require continuous surveillance and provide a basis for technical and/or economic evaluation. Examples of actual application and operational demonstrations are presented and discussed. Available equipment is reviewed with opportunity for evaluation of the merits of each system.

Additional subjects discussed include:

- Development and use of instrument specifications
- Installation and site requirements
- Operation and maintenance requirements
- Operating problems
- Storage, retrieval, and analysis of data.

INSTRUMENTAL ANALYSIS OF CHEMICAL POLLUTANTS IN THE AQUATIC ENVIRONMENT (107)

2 weeks

CINCINNATI, OHIO January 5–16, 1970

This course is designed for professionals and technical specialists concerned with the selection and performance of procedures for the collection, identification and measurement of organic and inorganic pollutants in the aquatic environment. The training course "Chemical Analyses for Water Quality (100)" or previous experience associated with methodology pertaining to the measurement of chemical pollutants in water is prerequisite for attendance.

Upon completion of the course, the participant will be able to apply the fundamental concepts of infrared, thin-layer and gas chromatographic techniques for the analysis of organic pollutants and the technique of atomic absorption for the analysis of trace inorganic contaminants. He will have an understanding of the distribution and behavior of these pollutants in the environment and will be knowledgeable regarding improved techniques of sample preparation and automated analyses.

The analytical procedures taught in the course will conform to those currently in use by the Federal Water Pollution Control Administration in its official investigation. In addition, attention will be given to implications of the latest research.

Classroom presentations will include:

- Collection and preservation of water, sediment and biological samples
- Extraction methodology
- Column and thin-layer chromatography
- Gas chromatography and detector technology applicable for the analysis of phenols, pesticides and digester gases
- Comparative methodology and quality control

Laboratory practice will comprise one-half of the course content and will include the following analyses:

- Gas chromatographic analysis of phenols and digester gases
- Trace metals by atomic absorption
- Chlorinated hydrocarbons and phenyl alkanoic acid herbicides in water
- Organophosphorus and chlorinated hydrocarbon insecticides in sediment
- Automated analyses for nitrate, phosphorus and hardness

CURRENT PRACTICES IN WATER MICROBIOLOGY (120)

2 weeks

CINCINNATI, OHIO July 14–25, 1969

EDISON, NEW JERSEY February 16–27, 1970

This course is designed for professional bacteriologists and other laboratory personnel engaged in the bacterial analysis of water.

The basic objective of the training is to provide the participant with knowledge and understanding of the significance of bacterial indicators of pollution. He gains the necessary skills required for detecting, measuring, and evaluating these pollution indicators.

Emphasis is given to the results of traditional as well as to recent investigations of bacterial indicators of pollution, including coliforms, fecal coliforms and fecal streptococci. The characteristics, environmental occurrence significance and methods of detection and enumeration of these bacterial groups are studied in detail. In addition, attention is given to the detection of enteric pathogenic bacteria in polluted waters, as an adjunct to determination of indicator groups, and to the increasing utilization of such findings in investigations of water pollution.

Classroom presentations and extensive laboratory application give the participant opportunity to develop ability in use of the most suitable laboratory methods and in the interpretation of laboratory data. Both Standard Methods and promising new methods are included. Multiple dilution tube methods and membrane filter methods are featured in the laboratory studies.

The potential role of the microbiologist in water quality surveillance and in short-term pollution investigations is studied. Through this phase of the training it is expected that the student can increase the range of his contributions to the planning, conduct, and reporting of organized water quality studies.

SURVEY OF CURRENT PRACTICES IN WATER MICROBIOLOGY (120.1)

1 week

ANCHORAGE, ALASKA* April 20–24, 1970

This course is offered for individuals requiring an overview of applications of microbiology in water pollution control. Persons responsible for performance, or for direct supervision of performance, of bacterial testing procedures may find "Current Practices in Water Microbiology (120)" better suited to their needs.

The course comprises a general survey of the same subject matter covered in Course 120. Laboratory application consists of limited demonstrations or class participation.

*Applications for the Anchorage, Alaska course should be submitted to:

Manpower and Training Officer
Pacific Northwest Water Laboratory
200 S. 35th Street
Corvallis, Oregon 97330

BACTERIAL METHODS IN WATER POLLUTION SURVEILLANCE (120.2)

1 week

ADA, OKLAHOMA **January 5–9, 1970**

This course is intended for professional bacteriologists and other laboratory personnel engaged in, or having technical responsibility for, bacterial analyses in water pollution survey and surveillance activities.

Upon completion of the course the student will have the requisite skills to properly collect environmental water samples and to take the necessary steps to minimize bacterial changes in the samples between collection and examination, and to detect and enumerate the total coliforms, fecal coliforms, and fecal streptococcus groups of bacteria by membrane filter methods. He will be familiar with multiple dilution tube methods for the above groups of pollution indicators. He will be familiar with methods used for summary and interpretation of bacterial water quality data. He will be able to apply standardized data handling techniques widely used to determine compliance with water quality standards.

Classroom presentations, consisting of lectures, demonstrations, and open discussions will present the background principles of the testing procedures. About half the course is devoted to laboratory application and critical evaluation of laboratory performance, to give the student ample opportunity to achieve the specified training objectives.

Supporting topics to be covered will include discussions of the nature, distribution, and significance of pollution-indicating bacteria, pathogenic bacteria and viruses. The significance of bacteria and other microorganisms in natural self-purification and in sewage treatment processes will be considered briefly. The role and responsibilities of FWPCA and other agencies in water quality surveillance will be covered.

FRESHWATER BIOLOGY AND POLLUTION ECOLOGY (140)

2 weeks

CINCINNATI, OHIO **October 20–31, 1969**

CORVALLIS, OREGON **September 14–25, 1970**

This course is designed for engineering and scientific personnel other than biologists engaged in water pollution analysis and control activities; however, biologists new to the field of pollution control may find it useful for orientation.

Within the framework of his personal background, capacities, and experience, the student should be able, on completion of this course to:

- Understand the basic environmental factors impinging on aquatic communities
- Recognize or identify to broad groups most freshwater organisms commonly encountered, using correct procedures and appropriate literature when available and also using judgment in assessing his own technical capacity in regard to the degree of identification attempted
- Select and use appropriate common types of biological field collection equipment and procedures
- Select and use appropriate types of biological laboratory analytical equipment and procedures
- Analyze an aquatic community and assess the likelihood that it may have been disturbed by pollution
- Recognize biological indications of particular types of pollution when present
- Predict possible effects of a given type of pollutant on a given habitat
- Organize a field survey to determine the severity and extent of pollution

Course work includes lectures, discussions, problem assignments, and laboratory sessions. Field work is included to allow student participation in selecting and using biological field collection equipment and familiarization with biological communities.

Representative topics usually include:

- Aquatic organisms of significance in pollution surveys
- Biological sampling
- Types of aquatic insects
- Use of artificial substrates
- Thermal pollution
- Biological problems of lakes, reservoirs, and streams
- Investigation of fish kills
- Eutrophication in the freshwater environment
- Water quality criteria for aquatic life

Students should bring appropriate clothing for field work, including rainwear. Boots will be supplied locally.

BASIC FRESHWATER BIOLOGY (140.1)

1 week

EDISON, NEW JERSEY March 30–April 3, 1970

This course is designed as an introduction to aquatic biology for sanitary engineers, scientists, and others who are involved in freshwater pollution studies, surveillance, and control. Biologists new to the field of aquatic biology and pollution problems may find it useful for orientation.

The general objective is to enable nonbiologists to become familiar with aquatic organisms and to make observations and record data which will be of use in the analysis of quality of freshwater. This course provides only the basic taxonomic skills necessary for preliminary participation in pollution studies.

Within the framework of his personal background, capacities, and experience, the participant should be able on completion of this course to:

- Recognize or identify some aquatic organisms commonly encountered in the region in which the course was given, using correct procedures and appropriate literature when available, and also using judgment assessing his own technical capacity in regard to the level of identification attempted
- Select or recommend appropriate types of common biological field collecting equipment and procedures for use in various local circumstances
- Select or recommend appropriate types of common biological laboratory analytical equipment and procedures
- Use selected items of field and laboratory equipment
- Sort, enumerate, and count collections of aquatic macro-invertebrates and plants and properly record the results

"Basic Freshwater Biology" is primarily devoted to a systematic survey of the various types of freshwater plants and animals, with particular emphasis given to those with a known pollutional relationship. This course will be accepted as prerequisite for Course 140.2 "Freshwater Pollution Ecology." Persons registering for Course 140.1 should, at their earliest opportunity, register for Course 140.2, which provides the additional training necessary to properly interpret and apply biological observations.

Participants should bring clothing appropriate for field work, including rainwear. Boots will be supplied locally when required.

FRESHWATER POLLUTION ECOLOGY (140.2)

1 week

CORVALLIS, OREGON September 15–19, 1969

EDISON, NEW JERSEY September 14–18, 1970

This course is offered for aquatic biologists or persons with comparable experience concerned with and/or involved in the application of biological principles, techniques and parameters to pollution studies and abatement programs.

Within the limitations of his personal background capacities and experience, the student will be able on completion of this course to:

- Analyze an aquatic community and assess the likelihood that it may have been disturbed by pollution
- Evaluate the effect of environmental charcteristics on the abundance, distribution or well-being of biota
- Recognize biological indications of particular types of pollution when present
- Predict possible effects of a given type of pollutant on a given habitat
- Organize a field survey to determine the severity and extent of pollution

Course work includes lectures, discussions, problem assignments and laboratory sessions.

Field work is included to allow student participation in selecting and using biological field collection equipment.

Representative topics usually include:

- Use of artificial substrates
- Thermal pollution
- Biological problems of lakes, reservoirs, and streams
- Investigation of fish kills
- Eutrophication in the freshwater environment
- Water quality criteria for aquatic life

Participants should bring appropriate clothing for field work (including rainwear). Boots will be supplied locally. This course may be offered separately on an advanced basis, in which case, applicants who have completed Course 140.1 will receive priority.

PLANKTON ANALYSIS (141)

2 weeks

CINCINNATI, OHIO — **May 11–22, 1970**
October 5–16, 1970

This course is offered for professional personnel concerned with the evaluation of natural and polluted waters by means of plankton examination. Limited attention is also devoted to the examination and interpretation of the fauna of activated sludge and waste stabilization ponds.

Instruction enables the student to carry out basic laboratory procedures in the identification and counting of both phytoplankton and zooplankton. He will be capable of applying taxonomic procedures to plankton and recognize the major types he is likely to encounter. He will be able to calibrate a microscope and to carry counting and group identification to the point of obtaining results which are qualitatively and quantitatively reliable.

Attention is given to the significance of various types of counts. Forms frequently found in water and wastewater treatment plants and polluted environments are emphasized. Techniques for plankton control are presented. Time is provided for discussion of local problems, both in class and with specialists at the training facility.

Representative course topics usually include:

- Water quality problems of biological origin
- Identification of planktonic animals and plants
  - (a series of lectures and laboratories comprising approximately half of the course)
- Microscope calibration
- Plankton analysis
  - Sampling and preparation
  - Techniques of counting
  - Enumeration, methods selection
- Plant operation problems
  - Plankton in stabilization ponds
  - Activated sludge fauna
  - Toxic algae
  - Other biological treatment problems
- Plankton control
  - Plant control
  - Control in surface waters

Although microscopes are available for class use, more effective training results when it is given on the same instrument that will be used in the home laboratory. The microscope should have magnifications up to approximately 400X; oil immersion is optional. The student consequently is urged to hand-carry his own microscope to the course.

MARINE BIOLOGY AND POLLUTION ECOLOGY (144)

2 weeks

CORVALLIS, OREGON — **June 15–26, 1970**

This two-week course is designed for engineering and scientific personnel involved in coastal and estuarine pollution analysis and control, who need practical experience in recognizing and evaluating biological phenomena.

On completion of this course, the participant should be able to:

- Identify common and significant marine organisms at sight, and be able to follow correct taxonomic procedure for the determination of unknowns
- Interpret the laws and principles governing distribution and survival of aquatic organisms, and apply them to situations involving pollution
- Use a basic vocabulary of practical biological terms
- Specify proper field-collecting and sampling techniques
- Specify appropriate supplementary laboratory analyses
- Specify pertinent complimentary nonbiological studies or analyses
- Recognize biological indications of particular types of pollution when present
- Predict possible effects of a given type of pollutant on a given habitat
- Effectively present biological data in a coordinated pollution report

The fundamentals of using biological principles in the solution of marine pollution problems in coastal areas are presented.

Participants will be taught to make certain elementary biological analyses of pollution in estuarine and coastal areas (as distinguished from fresh water or oceanic situations). Biologists new to the fields of pollution control and marine biology may also find this course useful for orientation.

The first week of the course will be devoted to a systematic survey of various marine organisms with emphasis on those forms with a known pollutional response while the second week is essentially devoted to the ecology of marine pollution. Applicants having a basic knowledge of marine biology should register for the course "Marine Pollution Ecology (144.2)."

Participants should bring field clothing including rainwear. Boots will be supplied locally when required.

BASIC MARINE BIOLOGY (144.1)

1 week

ATHENS, GEORGIA **May 11–15, 1970**

This course is designed as an introduction to marine biology for sanitary engineers, scientists, and others who are involved in coastal and estuarine pollution studies, surveillance, and control. Biologists new to the field of marine biology and pollution problems may find it useful for orientation.

The general objective is to enable nonbiologists to become familiar with marine organisms, and to make observations and record data which will be of use in the analysis of marine water quality. This course provides only the basic taxonomic skills necessary for preliminary participation in pollution studies.

Within the framework of his personal background, capacities, and experience, the participant should be able, on completion of this course to:

- Recognize or identify some marine organisms commonly encountered in the region in which the course was given, using correct procedures and appropriate literature when available, and also using judgment in assessing his own technical capacity in regard to the level of identification attempted
- Select or recommend appropriate types of common biological field collecting equipment and procedures for use in various local circumstances
- Select or recommend appropriate types of common biological laboratory analytical equipment and procedures
- Use selected items of field and laboratory equipment
- Sort, enumerate, and count collections of marine and estuarine macroinvertebrates and plants and properly record and results
- Make gross analyses of plankton or nekton, or carry out more refined analyses under supervision
- Carry out other assignments concerned with the collection, identification, or enumeration of marine or estuarine organisms

"Basic Marine Biology" is primarily devoted to a systematic survey of the various types of marine and estuarine plants and animals, with particular emphasis given to those with a known pollutional relationship. This course will be accepted as prerequisite for "Marine Pollution Ecology (144.2)" which provides the additional training necessary to properly interpret and apply biological observations.

Participants should bring appropriate clothing for field work including rainwear. Boots will be supplied locally when required.

MARINE POLLUTION ECOLOGY (144.2)

1 week

EDISON, NEW JERSEY **September 8–12, 1969**

ADA, OKLAHOMA **Sept. 29–Oct. 3, 1969**

This course is offered for marine biologists or those who have had suitable training or experience and are concerned with application of biological principles and techniques to pollution studies and abatement programs in marine and estuarine waters.

At the conclusion of the course each trainee will be able to:

- Analyze an aquatic community and assess the likelihood that it may have been disturbed by pollution
- Evaluate the effects of environmental characteristics on the abundance, distribution, or well-being of biota
- Recognize biological indications of particular types of pollution when present
- Comprehend and evaluate the effect of estuarine hydraulics on the aquatic habitat
- Predict possible effects of a given type of pollutant on a given habitat
- Organize a biological field survey for marine or estuarine waters

Course work includes lectures, discussions, problem assignments, and laboratory sessions. Participants will engage in field exercises in polluted and unpolluted waters.

Representative topics usually include:

- Marine waste disposal
- Ecological impact of pollution in estuaries and coastal waters
- Survey objectives
- Sampling techniques
- Analysis, interpretation, and presentation of biological data

It is planned that this course will be given in a Gulf Coast location. Announcement of this location will be made to accepted applicants in time for them to make travel and housing arrangements. Enrollees should bring adequate field clothing, including tennis shoes, for field work in warm, shallow waters.

APPLIED BIOLOGY SEMINAR (146)

3 days

ATHENS, GEORGIA	**December 9–11, 1969** **December 1–3, 1970**
CINCINNATI, OHIO	**January 19–21, 1970**

This course is intended for technically oriented persons concerned with planning, administering, collecting, evaluating, interpreting and reporting biological data related to water quality studies in both fresh and marine waters.

The main objective of this course is to promote more effective utilization of biological techniques which are fundamental in water pollution control. The student will develop a more complete understanding of the advantages and potential contributions of biological data and investigations to administrators, project leaders and others. Biologists will gain a better understanding of the limitations and restrictions placed on the administrator, and the nature of biological data which will be most useful for the improvement of water quality.

The following topics will usually be included:

- Orientation in the nature of the aquatic environment and aquatic ecology
- The nature of biological parameters
- Definition of "pollution" under various circumstances
- Orientations in the nature of various biological procedures and habitats such as taxonomy, benthos, periphyton, plankton, nekton, bioassays, and bacteriological investigations, followed by searching discussion of the potential of each in water quality enhancement
- Techniques for the evaluation and interpretation of biological data
- The multilateral problems of communication
- The use of biological data in the establishment and administration of water quality standards and criteria

Much of the course will consist of short formal presentations followed by extended informal discussions. Laboratory or field sessions usually are not scheduled, although an optional field excursion following the formal course may be arranged on occasion.

BIOASSAY IN POLLUTION ANALYSIS AND CONTROL (149)

1 week

CINCINNATI, OHIO	**December 15–19, 1969**
ADA, OKLAHOMA	**March 9–13, 1970**

This course is designed for those who need a practical competence in the design and use of bioassay and biomonitoring.

On completing this course the student should be able to select, design, construct, and operate a bioassay or biomonitoring setup adequate to meet most common needs in industry or regulatory organizations.

This course is considered to be at the application level. Knowledge will be provided for the more commonly accepted practices and principles involved in the laboratory use of aquatic organisms to detect or evaluate pollution.

The basic concept of the tolerance limit will be developed followed by the various ways by which it may be estimated. Static and flow through systems will be compared, as well as acute, sublethal, and chronic toxicity; single species versus community responses will be considered. Laboratory and field monitoring systems will be compared, and the types, sources, health, and care of experimental organisms that may be useful in different types of setups will be discussed.

Laboratory exercises and demonstrations constitute a significant portion of the course including an inspection trip to some nearby organization employing bioassay and/or related techniques if available.

The following topics are usually included as far as practicable:

- The nature of the tolerance limit
- Bioassay versus biomonitoring
- The role of laboratory versus field studies in water quality and fish kill investigations
- Chemical determinations associated with bioassay and biomonitoring
- Experimental organisms: types, sources, care and use
- The statistical design of bioassay
- The interpretation and application of results
- Case history studies of bioassay
- Laboratory practice in design and construction of equipment, and in running bioassays
- Laboratory demonstrations of additional types of setups

INTRODUCTION TO WATER QUALITY STUDY AND SURVEY COURSES

Identification and measurement of water quality conditions is contingent upon the application of knowledge specific to particular branches of physical and biological sciences. Overall water quality evaluation, on the other hand, requires understanding of the interaction and interrelationship of chemical and biological parameters, hydraulic principles and hydrologic conditions prevailing in a defined area (drainage basin). Programs to prevent or limit adverse water quality situations must correlate the technology of measurements and evaluation with understanding of socio-economic and legal conditions, concepts and principles prevailing in the human community.

The following five courses are concerned with the factors used to determine water quality and to recognize and evaluate pollution. As such, the courses contribute to the overall objective of supporting programs to prevent or limit water pollution.

The content of the courses "Water Quality Surveys I and II (161.1 and 161.2)" and "Water Quality Studies (161)" is basically the same. The emphasis and depth of coverage is varied to serve the needs of professional personnel having diverse types of responsibilities in planning, performing and administering programs related to water quality. To select the appropriate course(s), applicants should review the individual course descriptions in terms of their particular interest and program responsibility.

Course 161.3 "Estuary Studies" and Course 161.4 "Industrial Liquid Waste Surveys" extend the scope of this series of water quality surveys and studies.

WATER QUALITY STUDIES (161)

2 weeks

ATHENS, GEORGIA — **September 8–19, 1969**
CINCINNATI, OHIO — **October 6–17, 1969**
EDISON, NEW JERSEY — **May 4–15, 1970**

This course is offered for engineers, chemists, aquatic biologists, microbiologists and other professional specialists having administrative and operational responsibilities in planning and conducting water pollution surveys. The course is designed to be of greatest benefit to new professional workers in the field and to experienced workers whose normal duties in water quality surveys are too specialized to provide an overall view of the many special factors entering into the summation of an expression of water quality determination.

The course is intended to help participants understand the interdependency of various technical disciplines in evaluating water quality. Each student should be better able to identify his role and coordinate activities with other survey participants. He will be able to perform selected tests and measurements in each of the major areas of water quality surveys.

Students participate in classroom presentations, demonstrations and panel discussions. Field trips are conducted to local sites which are representative of the region in which the course is given. During the field trips students engage in observations and tests widely used by chemists, aquatic biologists and engineers in on-site studies. They collect samples for subsequent laboratory study and perform representative studies in the biology, microbiology, and chemistry laboratories.

Depending upon locations, major subject areas of the course may include:

- Sources and causes of deterioration of environmental water quality
- Tests and measurements used in evaluation of water quality by biologists, chemists, and microbiologists. This aspect of the course includes consideration of new technical developments in instrumentation and laboratory methodology.
- Fundamental factors in planning, conducting, interpreting findings and reporting results of a water pollution survey
- Special categories of water quality studies, including ground water quality studies, tidal water studies, water pollution surveillance networks
- Goals for water quality from the viewpoint of municipal and industrial water supplies, fish and wildlife management, aricultural usage and recreational use of waters.

WATER QUALITY SURVEYS – I (161.1)
(Field and Laboratory Procedures)

1 week

CORVALLIS, OREGON	**July 21–25, 1969** **July 20–24, 1970**
ADA, OKLAHOMA	**October 27–31, 1969**
CINCINNATI, OHIO	**June 8–12, 1970**

This course is designed for personnel actively engaged in field projects of water quality measurements and pollution identification. Emphasis is placed on understanding interdisciplinary needs and responsibilities in the accumulation and interpretation of data from field and laboratory activity.

Students will be able to apply new methods, techniques, and instruments used in field sampling and measurements, and in laboratory analysis of either collected or synthesized samples. They will develop an awareness of advantages and limitations of equipment, methods and techniques. Lectures and discussion periods develop an understanding of the related principles and theories.

Dependent upon course location, subject areas that may be covered include:

- General orientation to the aquatic environment and to the life systems existing within or dependent upon that environment
- Oxygen analyses in relation to various categories of pollutants
- Sampling techniques and analytical procedures in specific relation to Water Quality Standards compliance
- Procedures for sampling, identification, and enumeration of bacterial indicators of pollution
- Biological responses to pollution
- Flow measurements and current studies.

WATER QUALITY SURVEYS – II (161.2)
(Planning and Administrative Concepts)

1 week

ADA, OKLAHOMA	**November 3–7, 1969**
CINCINNATI, OHIO	**June 15–19, 1970**

This course is organized for the benefit of supervisory personnel and administrators responsible for planning and implementing programs to evaluate or improve water quality conditions.

The objective of the course is to strengthen the proficiency of planning and administrative personnel in water quality management programs.

The course covers the following elements of a survey in a logical sequence of planning and execution:

- Establishment of survey objectives
- Accumulation and evaluation of recorded data and literature
- Determination of information deficiencies
- Definition of interdisciplinary responsibilities
- Establishment of work schedule and determination of personnel and equipment needs
- Survey performance
- Compilation, integration and evaluation of accumulated data and information
- Report preparation and presentation
- Recommendation for future action (including possible alternatives) based on knowledge of socio-economic conditions and legislative authorization.

ESTUARY STUDIES (161.3)

1 week

ATHENS, GEORGIA June 15–19, 1970

The field of water pollution control in estuaries is a new one for persons concerned with clean water. This course is offered to professional specialists having an operational or an administrative responsibility for the study of estuaries. It is designed to provide a working knowledge of some of the basic concepts of the estuarine environment, the factors that will affect studies made in this environment and some of the special techniques used in its measurements.

Upon completion of the course the student will be familiar with some of the important physical, chemical and biological features of estuaries; be able to recognize some possible indicators of estuarine pollution; be able to apply some tested techniques for taking measurements; and have an appreciation of the sensitivity and variation in estuaries.

Topics to be covered include:

- Estuary variations that occur with changes in geography
- The basic types of estuaries
- The place of the estuary in food web ecology of economically important species of organism
- The problems of sediments, dredging and light conditions
- The types of information necessary to make proper decisions and how to collect and interpret this information
- The pitfalls, importance, and statistical methods of sampling (what is valid data)
- Estuary flushing characteristics and other hydrologic features
- Problems and some solutions for instrumentation
- The use of aerial photography

With the wide variation in estuaries, prospective students should be aware that emphasis will be placed on estuaries of the Southeastern United States.

It is planned that this course will be given in a field location so that field trips and studies are an intergal part of the course. Announcement of this location will be made to accepted students in time for them to make travel and housing arrangements. It is suggested that applicants do not plan to bring their families to this course because of expected working and living conditions. Enrollees should bring adequate field clothing, including tennis shoes, for field work in warm, shallow waters.

INDUSTRIAL LIQUID WASTE SURVEYS (161.4)

1 week

EDISON, NEW JERSEY November 17–21, 1969

This course is offered for engineers, chemists, or other professional personnel concerned with planning or conducting industrial liquid waste surveys. Such surveys may be intended to measure or characterize wastes at outfalls or in-plant locations, or both.

A student who completes this course will be able to plan, supervise, and evaluate an industrial waste survey. More specifically, he will be able to:

- Formulate and write valid survey objectives
- Specify pre-survey information requirements
- Apply good public relations practices with industry
- Select sampling points and locations
- Prescribe type of sample and frequency or interval
- Determine appropriate analyses and methods
- Choose optimum flow measurement methods and locations
- Determine personnel and equipment requirements
- Establish a coordinated work schedule for field and laboratory operations
- Evaluate progress and adjust plans as required
- Evaluate the extent to which data and activities have met survey objectives

This course includes a class survey of an actual industrial installation. Students should bring clothing appropriate for such field work. Lectures, workshops, and demonstrations are used to provide instruction in planning. Field trips and laboratories constitute actual survey operations.

The class will be divided into four groups each of which will be responsible for planning, conducting, and evaluating a survey under instructor supervision. The course will constitute an intensive period of training; students should be prepared to participate in evening sessions.

BIOLOGICAL TREATMENT TECHNOLOGY (162)

2 weeks

CINCINNATI, OHIO April 6–17, 1970
September 21–25, 1970

CORVALLIS, OREGON May 11–22, 1970

This course is offered for engineers, chemists, and other professional personnel concerned with selection, design, or control of biological processes for wastewater and sludge treatment. The course title replaces "Biological Treatment of Wastewaters and Sludges" used in previous editions of this Bulletin.

The course will enable participants to evaluate treatment feasibility, select and design a biological process, and control the biological treatment system for any wastes.

The course emphasizes biological treatment of complex or unusual wastes. Most of the concepts and principles discussed are equally valid and applicable for domestic waste treatment. Both aerobic and anaerobic processes are considered. Participants attend lectures and demonstrations, solve problems, and perform or observe laboratory experiments which illustrate process principles and economics.

A major portion of the course is devoted to the use of batch-type and continuous laboratory treatment procedures to select an appropriate treatment process and derive related design information. Other topics include organic and hydraulic loading, respiration rates, solids production, process selection (considering several of the common activated sludge, trickling filtration, and sludge digestion processes) and wastewater treatment microorganisms.

The individual who requires broader coverage of wastewater treatment technology should also consider future enrollment in courses "Physical-Chemical Treatment Technology (172.1)" and "Advanced Treatment of Domestic Wastes (172.2)."

CONTROL OF HAZARDOUS CHEMICAL DISCHARGES (165)

3 days

EDISON, NEW JERSEY September 22–24, 1969

This course is offered for employees of regulatory agencies who are assigned direct responsibility for control and alleviation of the effects of nonrecurring discharges of oil and other hazardous materials.

Upon completion of the course the student will be able to operate within interagency policies and guidelines concerning individual and agency responsibilities in event of discharge of hazardous materials. He will be familiar with the effects of such discharges and technological approaches to their control.

Considerable time is spent in explanation of Contingency Plans and Government regulations pertaining to such discharges. Procedures for satisfying these requirements and procuring technical services of the Federal Water Pollution Control Administration are explained using actual examples and case histories. Training is accomplished through lecture presentations, discussions, and — most important — the case-situation method. Participants will have an opportunity to practice response during such lessons.

STORET* SYSTEM (167)

1 week

Time and location to be announced.

This course is intended for persons directly involved in processing water quality and water resources data. Such activities may include compiling, storing, retrieving, summarizing, collating, and analyzing water quality data.

Course participants will be able to apply improved skills for rapid and efficient utilization of the STORET automatic data processing system for storing, retrieving, and analyzing water quality data and other related information.

Instruction will be provided in the basic principles and capabilities of the system and in the specific techniques of stream and lake coding, data storage, data retrieval, and data analysis using the STORET System. Course problems are based on actual practice and will provide students with experience in station location coding, data storage and modification, and retrieval and analysis.

The role of remote terminals in the STORET System will be explained.

Persons attending should have a technical background and experience in water quality and resources work but need not have experience in computer programming. Persons with computer programming experience will find areas for further utilization of STORET principles relating to specialized problems.

* STORET – A coined word combining STOrage and RETrieval.

GEOHYDROLOGIC RELATIONSHIPS IN WATER POLLUTION (168)

1 week

ADA, OKLAHOMA **February 16–20, 1970**

This course is intended for professional and technical personnel who are involved in operational programs of ground-water quality control.

Upon course completion the student will have an expanded capability for executing and managing operational programs of ground water quality determination and control.

Basic principles of geology and ground water hydrology are reviewed in specific relationships to their effect on ground water quality and quantity.

Principles, methods, and technology for determining or evaluating ground water hydraulic and aquifer characteristics are presented.

Legal and administrative aspects of ground water management are considered in terms of present statutes and need for new legislative policies reflecting current technology and anticipated utilization of the ground water resource.

Topics to be included in the course agenda will reflect recent investigations and research studies as appropriate in relation to:

Natural salt pollution and salt water intrusion
Ground water recharge
Pollution from waste disposal practices
Deep well disposal of oil field brine and industrial wastes
Agricultural practices
Mining practices

DATE EVALUATION AND ANALYSIS (171)

1 week

ATHENS, GEORGIA October 27–31, 1969

ADA, OKLAHOMA December 1–5, 1969

This course is intended for personnel responsible for administration, planning and/or supervision of projects involving accumulations and interpretation of numerical information pertaining to water quality.

Upon course completion the student will have a basis for applying appropriate principles and methods applicable to data evaluation and analysis.

Instruction will be provided by professional specialists in the field of mathematical statistics who have developed highly sophisticated methodology and manipulative techniques which provide, for the other professions, the tools needed to accomplish the necessary evaluation and interpretation of accumulated data. Utilization of these complex tools requires subject coverage to provide:

- Comprehensive understanding of statistical terminology and mathematical formulations
- Knowledge of procedural and operational constraints essential in accumulation of the numerical information (data)
- Understanding of the basic concepts of variation in mathematical functions in relation to variations in physical, ecological and environmental parameters
- Understanding of the potentials for and limitations of data analysis and evaluation

Prospective students are invited to bring selected data evaluation and analysis problems, representative of their operations, for possible discussion during the course.

PHYSICAL-CHEMICAL TREATMENT TECHNOLOGY (172.1)

1 week

CINCINNATI, OHIO February 2–6, 1970
December 7–11, 1970

EDISON, NEW JERSEY November 2–6, 1970

CORVALLIS, OREGON November 16–20, 1970

This course is offered for engineers, chemists, and other professional personnel concerned with selection, design, and control of physical and/or chemical methods of wastewater and sludge treatment. The course title replaces "Physical-Chemical Treatment of Wastewaters and Sludges."

Upon course completion the student will be able to evaluate the feasibility of treating wastewater by physical or chemical methods, select and design an appropriate process, and apply accepted control techniques to produce an acceptable effluent and conditioned sludge.

The course emphasizes physical-chemical treatment of complex or unusual wastes. Students attend lectures and demonstrations, solve problems, and participate in workshops and discussion groups. Laboratory experiments may be included to illustrate process principles and economics. Since the course emphasizes treatment of unusual wastewater, a semi-rational design approach is used. This approach combines the key elements of empirical (based on experience) and rational (having a theoretical basis) methods.

Course topics may include cooling, sedimentation, flocculation, mixing, flotation, incineration, vacuum filtration, solids concentration and drying, carbon absorption, and neutralization.

The individual who requires broader coverage of wastewater treatment technology should also consider future enrollment in courses "Biological Treatment Technology (162)" and "Advanced Treatment of Domestic Wastes (172.2)."

ADVANCED TREATMENT OF DOMESTIC WASTES (172.2)

1 week

CINCINNATI, OHIO — February 9–13, 1970; December 14–18, 1970

This course is offered for professional personnel concerned with selection and evaluation of methods for advanced treatment of domestic wastes. The course may be of special interest to employees of regulatory agencies and consulting engineering firms.

Upon completion of the course the student will be able to compare alternative methods and select processes to meet critical product quality and economic requirements.

The course currently emphasizes treatment of domestic wastes. The subject processes are intended to remove contaminants beyond levels possible with conventional technology or produce suitable effluents at lower cost or higher efficiency. As information becomes available on use of advanced processes to treat complex or unusual wastes, it will be included in course content.

In accordance with local requirements, course topics are selected from the following:

- Filtration and screening
- Chemical clarification
- Granular and powdered carbon absorption
- Oxidation
- Distillation
- Electrodialysis
- Ion exchange
- Reverse Osmosis
- Phosphate removal
- Nitrogen removal
- Disinfection
- Ultimate disposal
- Up-grading conventional treatment

This is a companion course to Course No. 162, "Biological Treatment Technology" and Course No. 172.1, "Physical-Chemical Treatment Technology." It is recommended that prospective trainees complete these courses or possess equivalent prior experience.

BASIC PRINCIPLES OF WASTEWATER TREATMENT OPERATION (173)

1 week

ANCHORAGE, ALASKA* — October 13–17, 1969

CORVALLIS, OREGON — November 17–21, 1969

This course is offered for personnel who are inexperienced in treatment plant operations. It is also recommended for those individuals in state and regional programs who are responsible for designing and conducting operator training courses.

Upon course completion the student will be familiar with:

- Characteristic effects of wastewaters upon water quality
- Treatment operations used to remove objectionable pollutants
- Basic factors of operational control and maintenance
- Essentials of testing plant performance and reporting results
- The operator's function in water pollution control

Treatment facilities will be presented in terms of unit operations such as collection, pumping, clarification, mixing, flocculation, aeration, oxidation and incineration. Engineering applications of these will be combined into processes in terms of the biological, chemical or physical behavior. Typical plant schematic diagrams will be used to facilitate recognition of plant units, their function and care. The same schematics will be used in presentation of basic tests, and calculations involving flow, concentration and loading as used for plant operational reports.

The teamwork approach will be stressed among the operator, his associates, his supervisors, his public, and local, state or regional agencies with respect to the services and information expected from him and the nature of assistance that he may obtain from others.

*Applications for the Anchorage, Alaska course should be submitted to:
Manpower and Training Officer
Pacific Northwest Water Laboratory
200 S. 35th Street
Corvallis, Oregon 97330

PLANNING, DEVELOPMENT AND MANAGEMENT OF WASTEWATER TREATMENT FACILITIES (175)

1 week

CINCINNATI, OHIO — September 15–19, 1969; October 19–23, 1970; November 9–13, 1970

This course is intended for planning and management personnel from public and private agencies planning to install new wastewater treatment facilities or to undertake major construction to improve existing facilities.

Participation in the course is expected to strengthen the capability of the student to plan, develop, and implement facilities for wastewater treatment.

As appropriate, lectures, panel discussions, general discussions, and case studies are used in consideration of the following topics:

- Responsibilities and interrelationships of Federal, State and local agencies concerned with water quality enhancement
- Public relations techniques designed for information and development of support before, during and after project development
- Essential steps necessary to evaluate existing conditions and needs in line with water quality objectives
- Considerations involved in financing planned construction of needed facilities
- Interrelationships of the Consultant, Contractor, public agencies and the public in the water pollution control effort
- The human factor will be stressed in making the completed facility a functional entity. Means whereby operating personnel may be motivated and trained to recognize proper function of each element of the facility and to achieve optimum performance on a continuing basis will be considered.

WATER POLLUTION CONTROL IN FEDERAL INSTALLATIONS (176)

3 days

ADA, OKLAHOMA — January 26–28, 1970

CINCINNATI, OHIO — March 23–25, 1970

This course is offered to employees of Federal agencies whose program activities may influence water quality. Such personnel may have either administrative or operational responsibilities and need not be experienced in water pollution control technology.

Upon course completion the student will be familiar with the responsibilities and relationships of Federal agencies in implementing the Nation's water pollution abatement program. He will have a limited orientation to water pollution control technology.

Considerable time is devoted to explanation of the requirements and implementation of Executive Order 11288, Bureau of the Budget Circular A-81, and other government regulations pertaining to control of environmental pollution by government installations. Procedures for satisfying these requirements and also procuring technical services of the Federal Water Pollution Control Administration are explained using actual examples and case histories.

Training is accomplished through lecture presentations, and panel and classroom discussions. Students may volunteer to present for discussion their own agency's pollution-related problems of an administrative or technical nature.

SEWAGE TREATMENT FACILITIES FOR FEDERAL INSTALLATIONS (177)

1 week

CORVALLIS, OREGON	**January 19–23, 1970**
CINCINNATI, OHIO	**March 16–20, 1970**
ANCHORAGE, ALASKA*	**October 12–16, 1970**

This course is offered for supervisors, engineers, and other Federal personnel responsible for design, construction, or management of sewage disposal facilities at Federal installations. The course may also be of interest to engineers and supervisors in State and local agencies having responsibility for recreational areas and small institutions.

On completion of this course, the student will have requisite technical information to assess a sewage treatment and disposal problem and to select the most advantageous system for a given location.

The course will cover waste treatment methods including those applicable to installations such as National Parks, Forest Service camps, small military installations, hospitals, schools and prisons.

In addition to the technical aspects of waste treatment and disposal, the legal responsibilities of public agencies, as they relate to adequate sewage treatment and disposal will be covered.

Course topics include:

- Federal policy and guidelines, Executive Order 11288
- States' criteria and requirements
- Septic tank and drainfield applications
- Secondary sewage treatment methods
- Sewage lagoon applications
- Tertiary treatment methods
- Disinfection of effluents
- Surveillance and operational controls
- Preliminary engineering studies.

*Applications for the Anchorage, Alaska course should be submitted to: Manpower and Training Officer
Pacific Northwest Water Laboratory
200 S. 35th Street
Corvallis, Oregon 97330

ANALYSIS AND CONTROL OF THERMAL POLLUTION (178)

4 days

CINCINNATI, OHIO	**September 21–24, 1970**
CORVALLIS, OREGON	**December 7–10, 1970**

This course is designed for professional personnel concerned with the evaluation, design, operation or monitoring of thermal discharges. Orientation in the biological significance of thermal discharges is also included.

On completion of this course the student should be able to:

- Evaluate the potential magnitude and extent of a heated discharge from a power plant or a cooling discharge from a storage reservoir
- Determine the nature and size of treatment structures necessary to produce an acceptable level of discharge temperature
- Understand the thermodynamic behavior of rivers and impoundments and the potential biological needs of aquatic organisms so that optimum types of discharge devices may be installed

Instruction includes an overview of the present day magnitude and future potential of thermal discharges with special reference to power production plants of various types. Orientation is also provided in the potential biological effects of both artifically heated and cooled waters and in the significance of the rate of change of temperature. Class problem sessions in small groups enable the student to obtain personal practice in the calculations necessary for predicting the physical impact of various types of thermal discharges. Types of biological information needed to evalute the potential effectiveness of the engineering predictions are also included.

Representative topics include:

- Thermal sources and loads
- Physical and chemical effects of thermal pollution
- Biological effects of various types of thermal discharges
- Process changes
- Waste heat utilization
- New methods of power generation
- Power generation
- Cooling devices
- Dispersion, dilution and flow regulation
- Water temperature prediction
- Data requirements, field studies and instrumentation
- Work problem sessions

OPERATOR INSTRUCTOR DEVELOPMENT (180)

1 week

ATHENS, GEORGIA April 13–17, 1970

This course is offered for persons having a responsibility for designing, managing and/or conducting various types of "short courses" for wastewater treatment plant operators.

Upon completion of the course the student will be able to write proper course objectives, design a course for a specific training level, and evaluate course content and course value. He will be able to prepare and present a meaningful talk to an audience. He will be able to advise others on types of instruction, classroom management, and proper instruction techniques.

The course will review current teaching methods and the preparation and management of short term training courses. Considerable time will be devoted to discussion and practice of training methods and materials. Special attention will be given to the material that should be included and excluded from operator short courses and to levels of instruction. A portion of the course will be devoted to a review and discussion of existing course materials available for the training of wastewater plant operators.

Topics to be covered include:

Determination of training needs and objectives
Course design
Preparation and use of training aids
Evaluation of training courses

Continuing construction and expansion of wastewater treatment facilities by all segments of society, coupled with an expanded technology, has increased the need for training and upgrading wastewater treatment plant operators. Many persons concerned with giving this training have had no formal instruction in teaching. This course will fill, in part, a special growing need in the water pollution control field.

Ada, Oklahoma
Athens, Georgia
Cincinnati, Ohio
Corvallis, Oregon
Edison, New Jersey

FEDERAL WATER POLLUTION CONTROL ADMINISTRATION FACILITIES

offering

Water Pollution Control Training

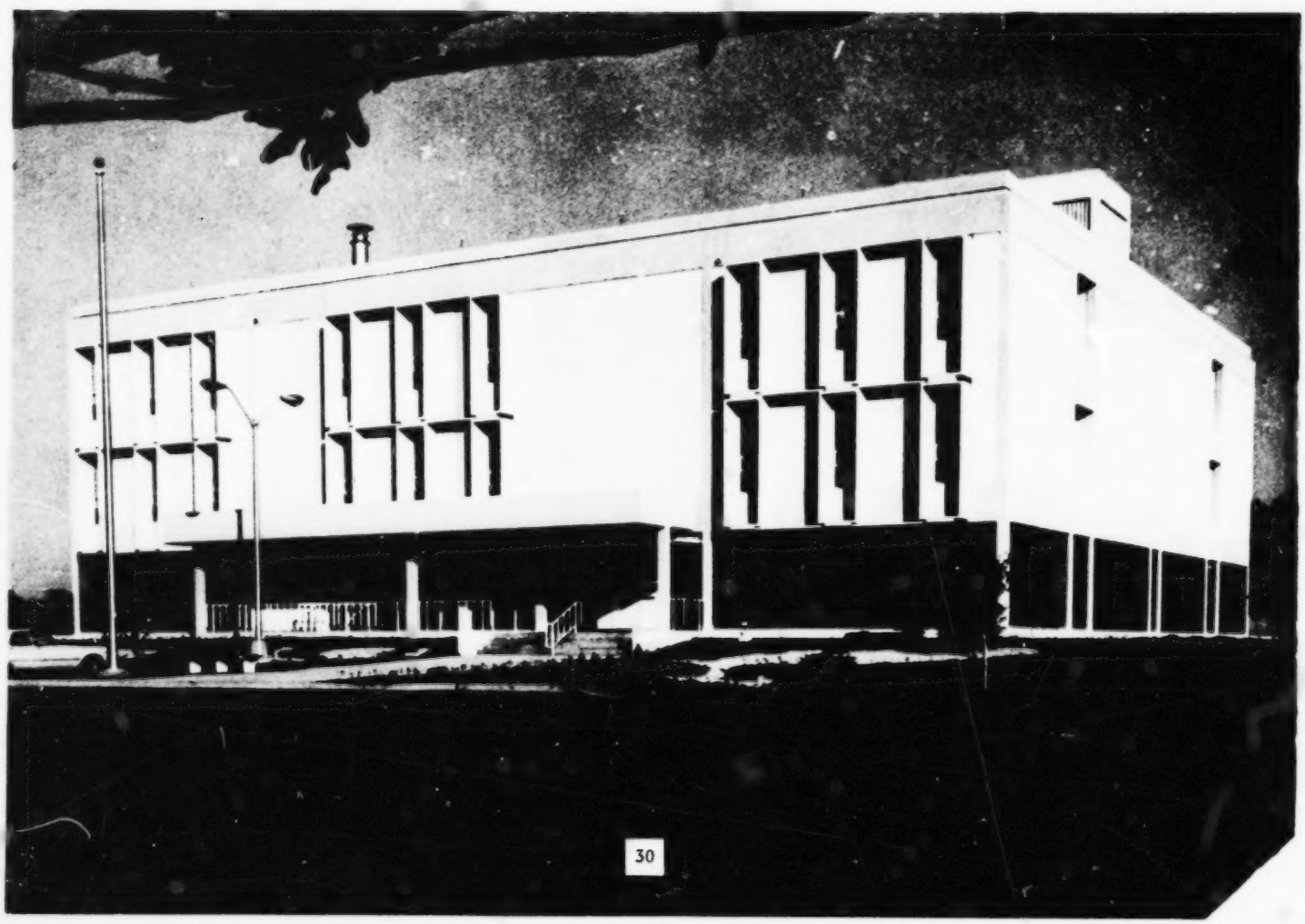
THE ROBERT S. KERR WATER RESEARCH CENTER

P. O. Box 1198

Ada, Oklahoma 74820

Commercial telephone number: Area Code 405 332-8800

FTS calls may be placed through Oklahoma City FTS Operator (405-236-2311); than ask for Ada 332-8800.



COURSES TO BE OFFERED BY
THE ROBERT S. KERR WATER RESEARCH CENTER
Ada, Oklahoma

Marine Pollution Ecology (144.2) ..... September 26–October 3, 1969

Water Quality Surveys – I (161.1)
(Field and Laboratory
Procedures) ..... October 27–31, 1969

Water Quality Surveys – II (161.2)
(Planning and Administrative
Concepts) ..... November 3–7, 1969

Data Evaluation and Analysis (171) ..... December 1–5, 1969

Bacterial Methods in Water Pollution
Surveillance (120.2) ..... January 5–9, 1970

Water Pollution Control in Federal
Installations (176) ..... January 26–28, 1970

Geohydrologic Relationships in Water
Pollution (168)..... February 16–20, 1970

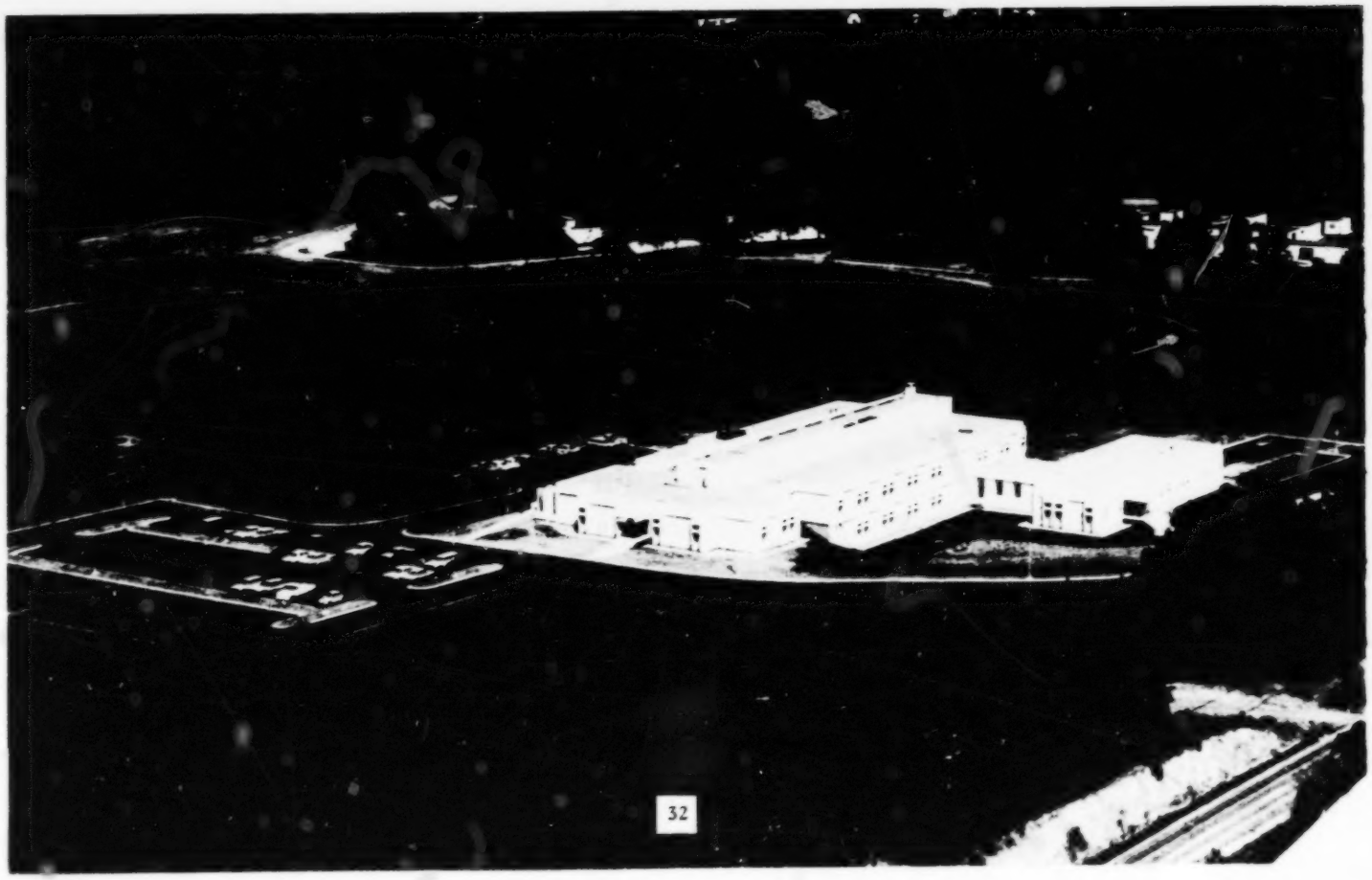
Bioassay in Pollution Analysis and
Control (149) ..... March 9–13, 1970

THE SOUTHEAST WATER LABORATORY

College Station Road

Athens, Georgia 30601

Commercial telephone number: Area Code 404 548-5641, Ext. 7261
FTS number: 404-548-7261



COURSES TO BE OFFERED BY

THE SOUTHEAST WATER LABORATORY

Athens, Georgia

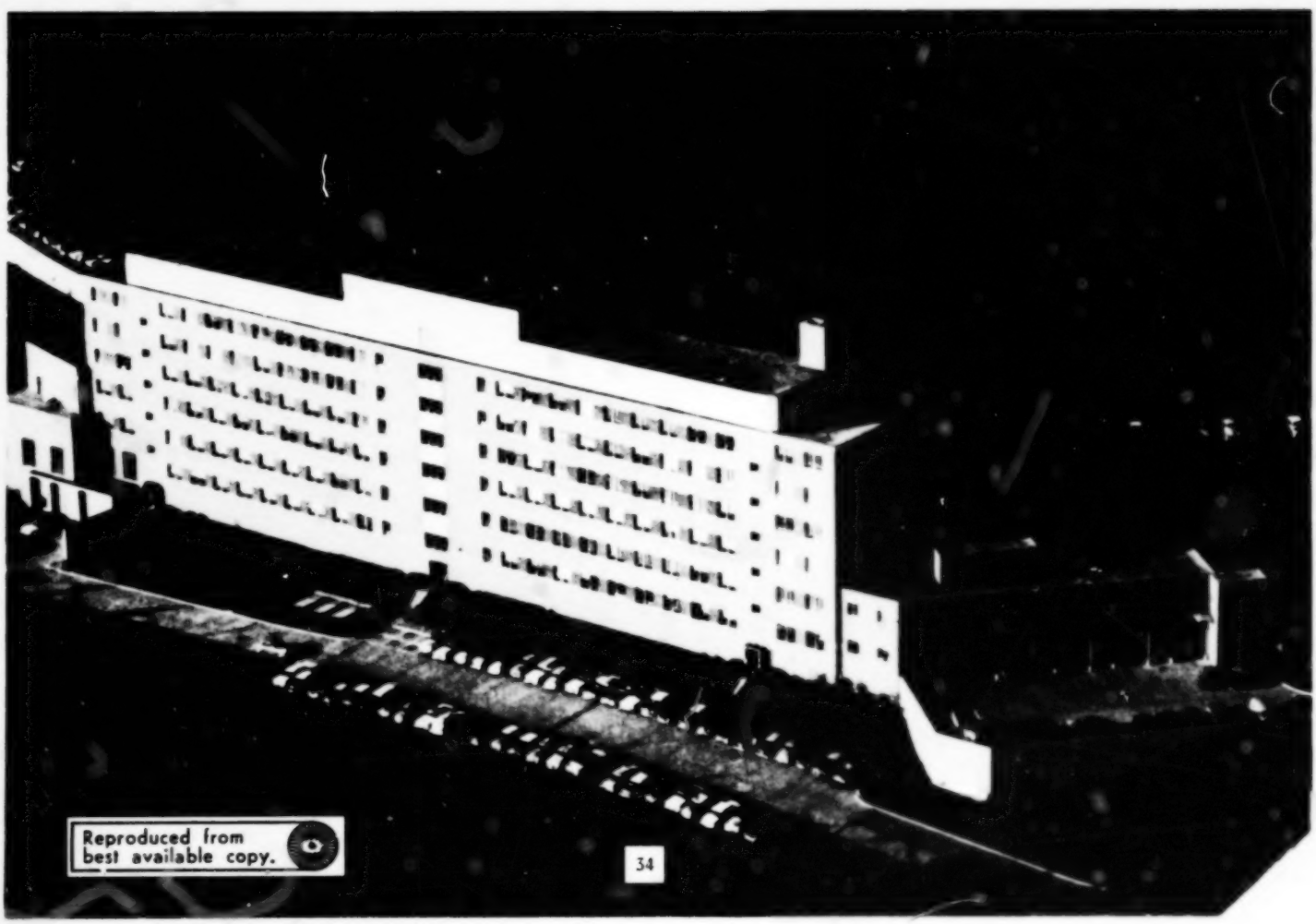
Water Quality Studies (161)	September 8–19, 1969
Data Evaluation and Analysis (171)	October 27–31, 1969
Applied Biology Seminar (146)	December 9–11, 1969
Pesticide Residue Analysis in Water (103.1) (Gas Chromatographic Systems and Techniques)	January 19–23, 1970
Pesticide Residue Analysis in Water (103.2) (Infrared Spectroscopy and Thin Layer Chromatography)	February 9–13, 1970
Pesticide Ecology Seminar (103.3)	February 24–26, 1970
Operator Instructor Development (180)	April 13–17, 1970
Basic Marine Biology (144.1)	May 11–15, 1970
Estuary Studies (161.3)	June 15–19, 1970
Characterization and Treatment of Organic Industrial Wastes (101)	September 28–October 9, 1970
Applied Biology Seminar (146)	December 1–3, 1970

THE ROBERT A. TAFT SANITARY ENGINEERING CENTER

4676 Columbia Parkway

Cincinnati, Ohio 45226

Commercial telephone number: Area Code 513 871-1820, Ext. 259
FTS number: 513-871-6259



Reproduced from best available copy.

COURSES TO BE OFFERED BY

NATIONAL TRAINING CENTER

Cincinnati, Ohio

Current Practices in Water Microbiology (120)..... July 14–25, 1969

Chemical Analyses for Water Quality (100) ..... July 28–August 8, 1969

Planning, Development, and Management of Wastewater Treatment Facilities (175).....September 15–19, 1969

Water Quality Studies (161) .....October 6–17, 1969

Freshwater Biology and Pollution Ecology (140) ..... October 20–31, 1969

Chemical Analyses for Water Quality (100) .....November 3–14, 1969

Bioassay in Pollution Analysis and Control (149) ..... December 15–19, 1969

Instrumental Analysis of Chemical Pollutants in the Aquatic Environment (107) ..... January 5–16, 1970

Applied Biology Seminar (146) ..... January 19–21, 1970

Physical-Chemical Treatment Technology (172.1) ..... February 2–6, 1970

Advanced Treatment of Domestic Wastes (172.2)..... February 9–13, 1970

Sewage Treatment Facilities for Federal Installations (177) .... March 16–20, 1970

Water Pollution Control in Federal Installations (176) ..... March 23–25, 1970

Biological Treatment Technology (162).....April 6–17, 1970

Orientation to Automated Instrumentation in Surveillance (106) .....April 27–May 1, 1970

Plankton Analysis (141).....May 11–22, 1970

Water Quality Surveys – I (161.1) (Field and Laboratory Procedures) ..... June 8–12, 1970

Water Quality Surveys – II (161.2) (Planning and Administrative Concepts) ..... June 15–19, 1970

Chemical Analyses for Water Quality (100) .....July 13–24, 1970

Biological Treatment Technology (162)..... September 21–25, 1970

Analysis and Control of Thermal Pollution (178) ..... September 21–24, 1970

Plankton Analysis (141) ..... October 5–16, 1970

Planning, Development and Management of Wastewater Treatment Facilities (175).....October 19–23, 1970

Planning, Development and Management of Wastewater Treatment Facilities (175) ..... November 9–13, 1970

Physical-Chemical Treatment Technology (172.1) ..... December 7–11, 1970

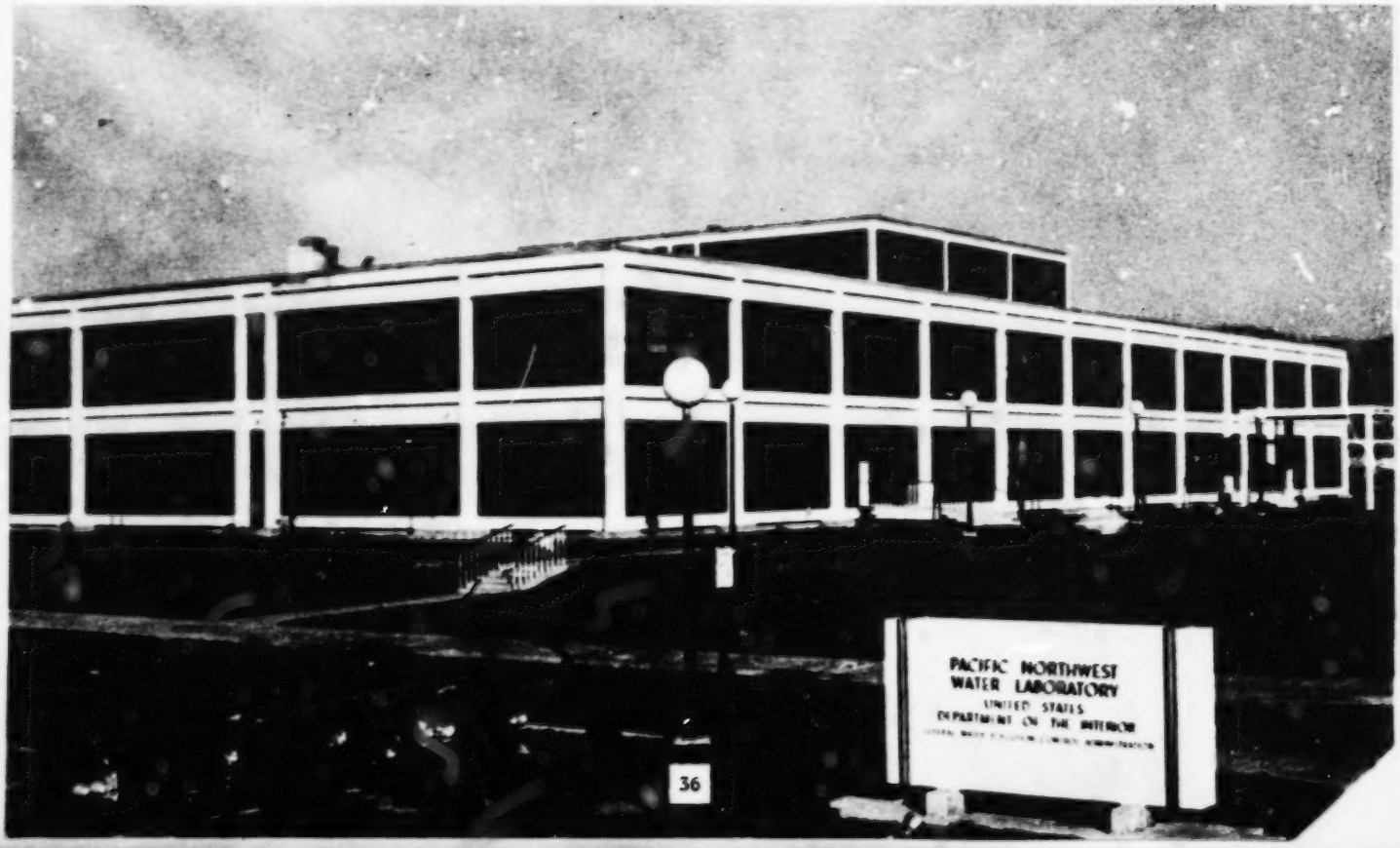
Advanced Treatment of Domestic Wastes (172.2) ..... December 14–18, 1970

THE PACIFIC NORTHWEST WATER LABORATORY

200 South 35th Street

Corvallis, Oregon 97330

Commercial telephone number: Area Code 503 752-4281, Ext. 318
FTS number: 503-752-4318



COURSES TO BE OFFERED BY
THE PACIFIC NORTHWEST WATER LABORATORY
Corvallis, Oregon

Water Quality Surveys – I (161.1)
(Field and Laboratory Procedures) ..... July 21–25, 1969

Freshwater Pollution Ecology (140.2) ..... September 15–19, 1969

Basic Principles of Wastewater
Treatment Operation (173) ..... October 13–17, 1969
(Alaska)

Basic Principles of Wastewater
Treatment Operation (173) ..... November 17–21, 1969

Sewage Treatment Facilities for Federal Installations (177).. January 19–23, 1970

Chemical Analyses for Water Quality (100) ..... March 2–13, 1970

Survey of Chemical Analyses for Water Quality (100.2)..... April 13–17, 1970
(Alaska)

Survey of Current Practices in Water Microbiology (120.1)..... April 20–24, 1970
(Alaska)

Biological Treatment Technology (162) ..... May 11–22, 1970

Marine Biology and Pollution Ecology (144) ..... June 15–26, 1970

Water Quality Surveys – I (161.1)
(Field and Laboratory Procedures) ..... July 20–24, 1970

Freshwater Biology and Pollution Ecology (140) ..... September 14–25, 1970

Sewage Treatment Facilities for Federal Installations (177).. October 12–16, 1970
(Alaska)

Physical-Chemical Treatment Technology (172.1) .....Novenber 16–20, 1970

Analysis and Control of Thermal Pollution (178) ..... December 7–10, 1970

HUDSON-DELAWARE BASINS OFFICE

Northeast Regional Training Center

Edison, New Jersey 08817

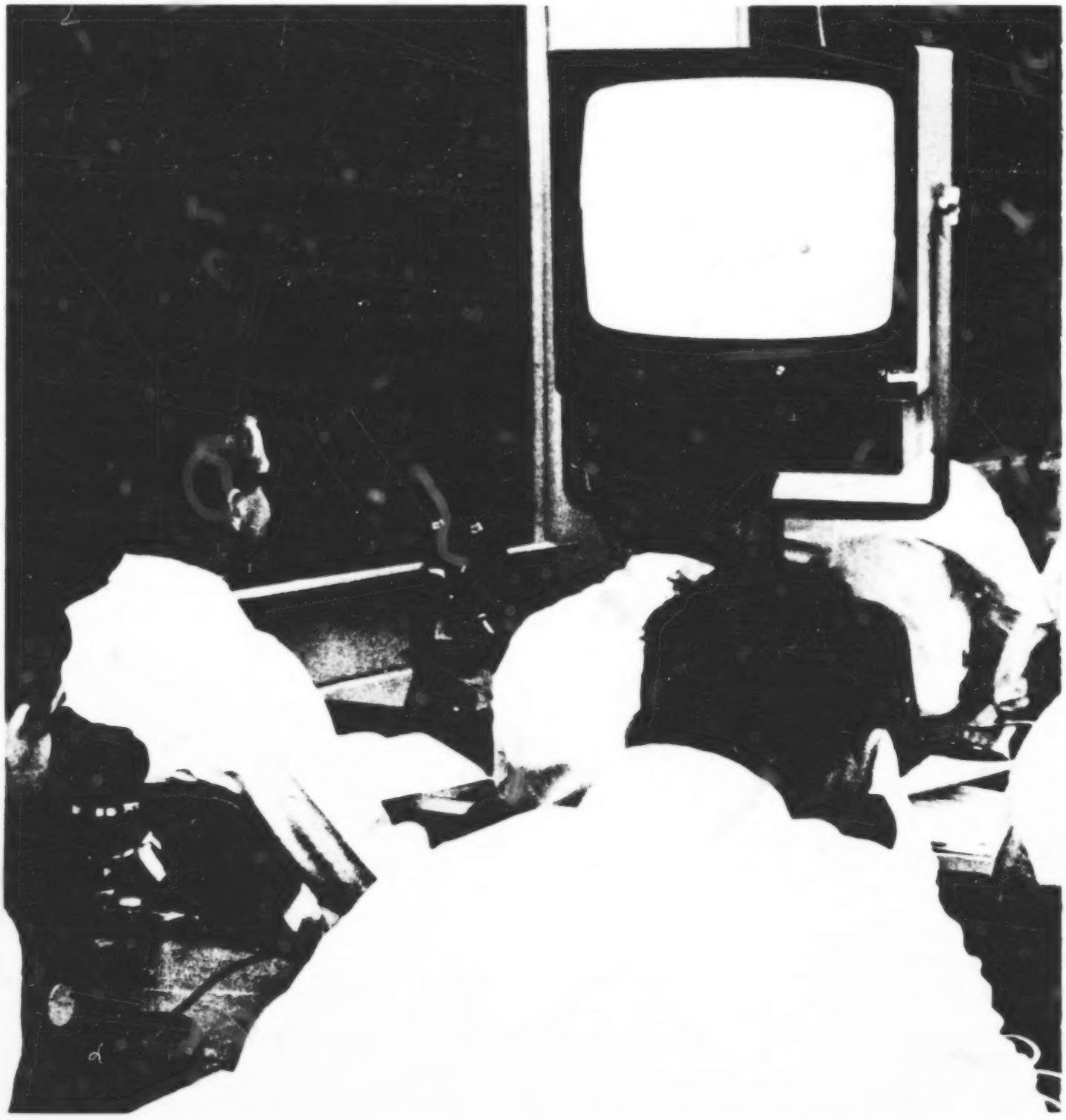
Commercial telephone number: Area Code 201 548-3347, Ext. 47
FTS number: 201-846-4647

COURSES TO BE OFFERED BY

THE NORTHEAST REGIONAL TRAINING CENTER

Edison, New Jersey

Marine Pollution Ecology (144.2)	September 8–12, 1969
Control of Hazardous Chemical Discharges (165)	September 22–24, 1969
Industrial Liquid Waste Surveys (161.4)	November 17–21, 1969
Basic Water Quality Chemistry (100.1)	January 5–9, 1970
Current Practices in Water Microbiology (120)	February 16–27, 1970
Basic Freshwater Biology (140.1)	March 30–April 3, 1970
Water Quality Studies (161)	May 4–15, 1970
Freshwater Pollution Ecology (140.2)	September 14–18, 1970
Physical-Chemical Treatment Technology (172.1)	November 2–6, 1970



Reproduced from
best available copy.

Applications

FORM APPROVED
BUDGET BUREAU
NO. 42-R1506

U.S. DEPARTMENT OF THE INTERIOR

Federal Water Pollution Control Administration
Training Program

APPLICATION FOR TRAINING

I. NAME OF APPLICANT:

Mr.
Mrs.
Miss _____

(first) (middle initial) (last)

II. COURSE DESIRED:

Title _____ Course No. _____

Place where given _____ Dates _____

FWPCA Training Office conducting course _____

III. SPONSOR OR EMPLOYER:

Name of Organization or Firm _____

Address _____

_____ Phone _____

IV. MAILING ADDRESS OF APPLICANT (If different from above):

_____

_____ Phone _____

V. PROFESSIONAL STATUS:

Profession or Occupation _____

Position Title _____

Brief description of your present position _____

_____

_____

_____

Total years experience in profession _____

VI. PREVIOUS WATER POLLUTION CONTROL TRAINING COURSES ATTENDED:

Titles	Dates	Location

VII. EDUCATION:

High School Graduate: ____ *No* ____

Number of years education completed beyond high school _____

College or University	Date attended	Major	Degree

VIII. SIGNATURES:

Signature of Approving Officer (Required for FWPCA personnel; optional for other agencies)	*Signature of Applicant*
Title	*Date*

MAIL TO THE FWPCA OFFICE CONDUCTING THE TRAINING COURSE

Manpower and Training Program
Robert S. Kerr Water Research Center, FWPCA
P. O. Box 1198
Ada, Oklahoma 74820

National Training Center
Federal Water Pollution Control Administration
4676 Columbia Parkway
Cincinnati, Ohio 45226

Northeast Regional Training Center
Hudson-Delaware Basins Office, FWPCA
Edison, New Jersey 08817

Manpower and Training Program
Pacific Northwest Water Laboratory, FWPCA
200 S. 35th Street
Corvallis, Oregon 97330

Training and Manpower Development
Southeast Water Laboratory, FWPCA
College Station Road
Athens, Georgia 30601

U.S. DEPARTMENT OF THE INTERIOR

FORM APPROVED
BUDGET BUREAU
NO. 42-R1506

Federal Water Pollution Control Administration
Training Program

APPLICATION FOR TRAINING

I. NAME OF APPLICANT:

Mr.
Mrs.
Miss _____

(first) (middle initial) (last)

II. COURSE DESIRED:

Title _____ Course No. _____

Place where given _____ Dates _____

FWPCA Training Office conducting course _____

III. SPONSOR OR EMPLOYER:

Name of Organization or Firm _____

Address _____

_____ Phone _____

IV. MAILING ADDRESS OF APPLICANT (If different from above):

_____

_____ Phone _____

V. PROFESSIONAL STATUS:

Profession or Occupation _____

Position Title _____

Brief description of your present position _____

_____

_____

_____

Total years experience in profession _____

VI. PREVIOUS WATER POLLUTION CONTROL TRAINING COURSES ATTENDED:

Titles	Dates	Location

VII. EDUCATION:

High School Graduate: ____ *No* ____

Number of years education completed beyond high school _____

College or University	Date attended	Major	Degree

VIII. SIGNATURES:

_____ _____

Signature of Approving Officer (Required for FWPCA personnel; optional for other agencies)

Signature of Applicant

_____ _____

Title *Date*

MAIL TO THE FWPCA OFFICE CONDUCTING THE TRAINING COURSE

Manpower and Training Program
Robert S. Kerr Water Research Center, FWPCA
P. O. Box 1198
Ada, Oklahoma 74820

National Training Center
Federal Water Pollution Control Administration
4676 Columbia Parkway
Cincinnati, Ohio 45226

Northeast Regional Training Center
Hudson-Delaware Basins Office, FWPCA
Edison, New Jersey 08817

Manpower and Training Program
Pacific Northwest Water Laboratory, FWPCA
200 S. 35th Street
Corvallis, Oregon 97330

Training and Manpower Development
Southeast Water Laboratory, FWPCA
College Station Road
Athens, Georgia 30601

FWPCA-97 (3-69) (Reverse)

Chronological Schedule of Courses

FY–70
(July 1969 – June 1970)

Current Practices in Water Microbiology (120), Cincinnati, Ohio	July 14–25, 1969
Water Quality Surveys – I (161.1), Corvallis, Oregon	July 21–25, 1969
Chemical Analyses for Water Quality (100), Cincinnati, Ohio	July 28–August 8, 1969
Marine Pollution Ecology (144.2), Edison, New Jersey	September 8–12, 1969
Water Quality Studies (161), Athens, Georgia	September 8–19, 1969
Freshwater Pollution Ecology (140.2), Corvallis, Oregon	September 15–19, 1969
Planning, Development and Management of Wastewater Treatment Facilities (175), Cincinnati, Ohio	September 15–19, 1969
Control of Hazardous Chemical Discharges (165), Edison, New Jersey	September 22–24, 1969
Marine Pollution Ecology (144.2), Ada, Oklahoma	September 29–October 3, 1969
Water Quality Studies (161), Cincinnati, Ohio	October 6–17, 1969
Basic Principles of Wastewater Treatment Operation (173), Anchorage, Alaska	October 13–17, 1969
Freshwater Biology and Pollution Ecology (140), Cincinnati, Ohio	October 20–31, 1969
Data Evaluation and Analysis (171), Athens, Georgia	October 27–31, 1969
Water Quality Surveys – I (161.1), Ada, Oklahoma	October 27–31, 1969
Water Quality Surveys – II (161.2), Ada, Oklahoma	November 3–7, 1969
Chemical Analyses for Water Quality (100), Cincinnati, Ohio	November 3–14, 1969
Basic Principles of Wastewater Treatment Operation (173), Corvallis, Oregon	November 17–21, 1969
Industrial Liquid Waste Surveys (161.4), Edison, New Jersey	November 17–21, 1969
Data Evaluation and Analysis (171) Ada, Oklahoma	December 1–5, 1969
Applied Biology Seminar (146), Athens, Georgia	December 9–11, 1969
Bioassay in Pollution Analysis and Control (149), Cincinnati, Ohio	December 15–19, 1969
Basic Water Quality Chemistry (100.1), Edison, New Jersey	January 5–9, 1970
Bacterial Methods in Water Pollution Surveillance (120.2), Ada, Oklahoma	January 5–9, 1970
Instrumental Analysis of Chemical Pollutants in the Aquatic Environment (107), Cincinnati, Ohio	January 5–16, 1970
Applied Biology Seminar (146), Cincinnati, Ohio	January 19–21, 1970
Sewage Treatment Facilities for Federal Installations (177), Corvallis, Oregon	January 19–23, 1970
Pesticide Residue Analysis in Water (103.1), Athens, Georgia	January 19–23, 1970
Water Pollution Control in Federal Installations (176), Ada, Oklahoma	January 26–28, 1970
Physical–Chemical Treatment Technology (172.1) Cincinnati, Ohio	February 2–6, 1970
Advanced Treatment of Domestic Wastes (172.2), Cincinnati, Ohio	February 9–13, 1970
Pesticide Residue Analysis in Water (103.2), Athens, Georgia	February 9–13, 1970
Geohydrologic Relationships in Water Pollution (168), Ada, Oklahoma	February 16–20, 1970
Current Practices in Water Microbiology (120), Edison, New Jersey	February 16–27, 1970
Pesticide Ecology Seminar (103.3), Athens, Georgia	February 24–26, 1970
Chemical Analyses for Water Quality (100), Corvallis, Oregon	March 2–13, 1970
Bioassay in Pollution Analysis and Control (149), Ada, Oklahoma	March 9–13, 1970
Sewage Treatment Facilities for Federal Installations (177), Cincinnati, Ohio	March 16–20, 1970
Water Pollution Control in Federal Installations (176), Cincinnati, Ohio	March 23–25, 1970
Basic Freshwater Biology (140.1), Edison, New Jersey	March 30–April 3, 1970
Biological Treatment Technology (162), Cincinnati, Ohio	April 6–17, 1970
Survey of Chemical Analyses for Water Quality (100.2), Anchorage, Alaska	April 13–17, 1970
Operator Instructor Development (180), Athens, Georgia	April 13–17, 1970
Survey of Current Practices in Water Microbiology (120.1), Anchorage, Alaska	April 20–24, 1970
Orientation to Automated Instrumentation in Surveillance (106), Cincinnati, Ohio	April 27–May 1, 1970
Water Quality Studies (161), Edison, New Jersey	May 4–15, 1970
Basic Marine Biology (144.1), Athens, Georgia (Field)	May 11–15, 1970
Plankton Analysis (141), Cincinnati, Ohio	May 11–22, 1970
Biological Treatment Technology (162), Corvallis, Oregon	May 11–22, 1970
Water Quality Surveys – I (161.1), Cincinnati, Ohio	June 8–12, 1970
Water Quality Surveys – II (161.2), Cincinnati, Ohio	June 15–19, 1970
Estuary Studies (161.3), Athens, Georgia	June 15–19, 1970
Marine Biology and Pollution Ecology (144), Corvallis, Oregon	June 15–26, 1970

FY-71
(July 1970 – December 1970)

Chemical Analyses for Water Quality (100) Cincinnati, Ohio ..... July 13–24, 1970
Water Quality Surveys – I (161.1), Corvallis, Oregon ..... July 20–24, 1970
Freshwater Pollution Ecology (140.2), Edison, New Jersey ..... September 14–18, 1970
Freshwater Biology and Pollution Ecology (140), Corvallis, Oregon ..... September 14–25, 1970
Analysis and Control of Thermal Pollution (178), Cincinnati, Ohio ..... September 21–24, 1970
Biological Treatment Technology (162), Cincinnati, Ohio ..... September 21–25, 1970
Characterization and Treatment of Organic Industrial Wastes (101), Athens, Georgia ..... September 28–October 9, 1970
Plankton Analysis (141), Cincinnati, Ohio ..... October 5–16, 1970
Sewage Treatment Facilities for Federal Installations (177),
Anchorage, Alaska ..... October 12–16, 1970
Planning, Development and Management of Wastewater Treatment
Facilities (175), Cincinnati, Ohio ..... October 19–23, 1970
Physical-Chemical Treatment Technology (172.1), Edison, New Jersey ..... November 2–6, 1970
Planning, Development and Management of Wastewater Treatment
Facilities (175), Cincinnati, Ohio (Field) ..... November 9–13, 1970
Physical-Chemical Treatment Technology (172.1), Corvallis, Oregon ..... November 16–20, 1970
Applied Biology Seminar (146), Athens, Georgia ..... December 1–3, 1970
Analysis and Control of Thermal Pollution (178), Corvallis, Oregon ..... December 7–10, 1970
Physical-Chemical Treatment Technology (172.1) Cincinnati, Ohio ..... December 7–11, 1970
Advanced Treatment of Domestic Wastes (172.2), Cincinnati, Ohio ..... December 14–18, 1970

U.S. DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
4676 Columbia Parkway
Cincinnati, Ohio 45226

We are pleased to send you this Water Pollution Control Training Program Bulletin of Courses for the period July 1, 1969 through December 31, 1970. Undoubtedly many professional and technical people would be interested in these training opportunities if they knew about the courses offered at the various water laboratories of the Administration. We will be pleased to send the Bulletin to any friends or associates who you think will be interested in this information.

Detach the convenient postcard, use name of organization, business address, and include zip code.

Please send July 1, 1969 through December 31, 1970 Bulletin of Courses to the following:

_____
_____
_____
_____ Zip

_____
_____
_____
_____ Zip

_____
_____
_____
_____ Zip

BULLETIN OF COURSES